The Decision Makers

CONTENT AREAS

- **Math**
  percentages, pie-chart graphs, volume, ratios
- **Social studies**
  business, industry, community
- **Science**
  solid waste, prediction, classification, measurement of weight and volume, verification

OBJECTIVES

Students will…

- read, understand and analyze information about trash, and
- make informed decisions about source reduction

MATERIALS

For students working in groups of two or three

- Instruction Sheet
- Decision Grid handout
- Charts 1 to 4
  (See Materials, Curriculum Guide)

TIME

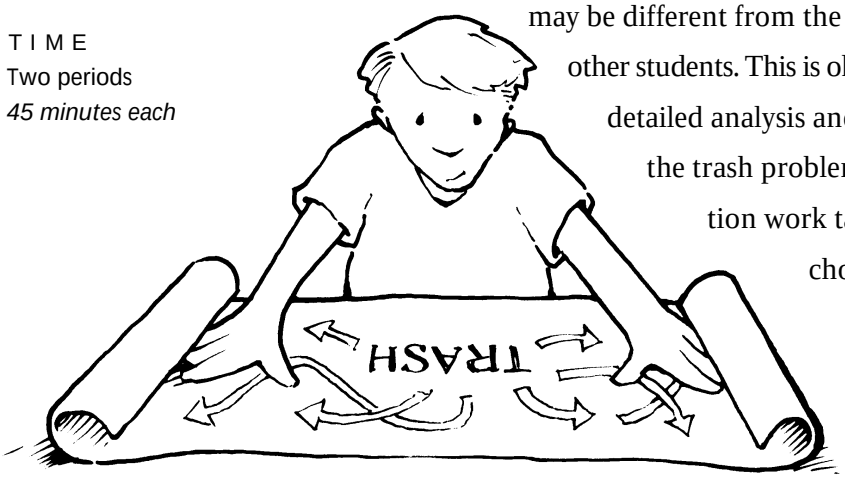
Two periods
45 minutes each

Information is an essential factor in decision making. Some say it is the key to the future. The real key may be knowing where to get reliable information, how to understand and analyze it, and then how to use it.

Information is also crucial to understanding trash and solving related problems. In this activity, students are presented with some information–primarily facts about trash. Through a series of steps, they use this information to direct and develop a strategy for source reduction.

These steps are loosely based upon a complex strategy that product designers, businesses, local and state officials, and other decision makers use to make choices about source reduction. Your students will be asked to make choices about source reduction. Some choices may be difficult, others may be obvious. What is most important is that students use the information to help make their choices.

Just as various decision makers may interpret and use the information according their interests, students' answers may be different from the "experts," from your own, or other students. This is okay, because what counts is detailed analysis and creative thinking. Solving the trash problem and making source reduction work takes thought, new ideas, choices and, finally, action.



PROCEDURE

1. Divide students into groups of two or three. *Read them the following scenario:*

> Landfills and incineration have become very controversial issues in your state, and the Governor has pledged to make the environment a top priority. Although recycling efforts have been in place for some time, the state can no longer afford to pay ever-higher rates for resource recovery.
>
> The key goal set by the Governor is to reduce the total state waste that's now sent to landfills and incinerators by 10 percent. This would be a reduction of approximately 1.5 million tons from the 15 million tons currently burned or dumped annually. Since it costs about $40 per ton to landfill waste, the program could save $60 million if the reductions occur through source reduction. The Governor is willing to budget the money needed to accomplish the objective, using some of the savings to fund the program.

> The Governor has turned to you, a waste expert, to help come up with a plan to solve the state's most critical waste problems. You will be working as part of a team to develop the plan, which you must present to the Governor for approval. Specifically, your team is asked to:
>
> - Develop a list of priorities
> - Explain why you chose the priorities
> - Provide a list of source reduction options for each priority.

2. Give each student or group a copy of the Instruction and Trash Trivia Sheet, Charts 1–4 (from the Curriculum Guide) and the Decision Grid. Using the Charts, groups should lay out options on the Decision Grid. They can then prioritize their options based upon any factors they feel are appropriate.

3. This activity is student-directed and requires focused collaboration. As students work to complete the activity, be on hand to answer questions and facilitate discussion. You may also need to provide additional resources on solid waste and source reduction for students to do additional research.

4. When all groups are finished, have each group present its plans. Encourage students to be convincing and creative in their presentations. You may want to allow for a short question-and-answer period at the end of each presentation.

QUESTIONS

Follow the activity with a class discussion

a. Is it possible to develop a qualitative way to prioritize areas targeted for source reduction?

b. How did you determine your priorities?

c. Do all of the criteria have relative weight?

d. What makes your plan effective?

e. What was most important in coming up with a solution?

f. Did you verify the facts? How? What role did the fact sheet play in your decision making? What if the facts were incorrect?

g. Plans look good on paper. Is it possible for your plan to be implemented in the real world? Why or why not?

h. Did you make any plans to verify the current trash situation and measure the effectiveness of your plans?

EXTENSIONS

1. The Governor is sold on your plan. Now he wants to implement legislation and again needs your advice. Which options should become mandatory laws? Which should remain as voluntary actions? Explain your reasons.

2. Contact your community or state government and find out what strategies they have used to handle the trash problem. What are their priorities?

Remind students that if they propose legislative solutions based on bans (prescriptive approaches), this can take away the possibility of creative solutions that evolve over time. Also they must take into account all types of families from the poor to rich, urban and rural. Very few mandates are fair to all people. For example, banning disposable diapers may seem like a quick fix for one percent of trash, but would be a severe blow to working mothers whose children are in day care centers, since most day care centers insist on disposable diapers for health reasons.

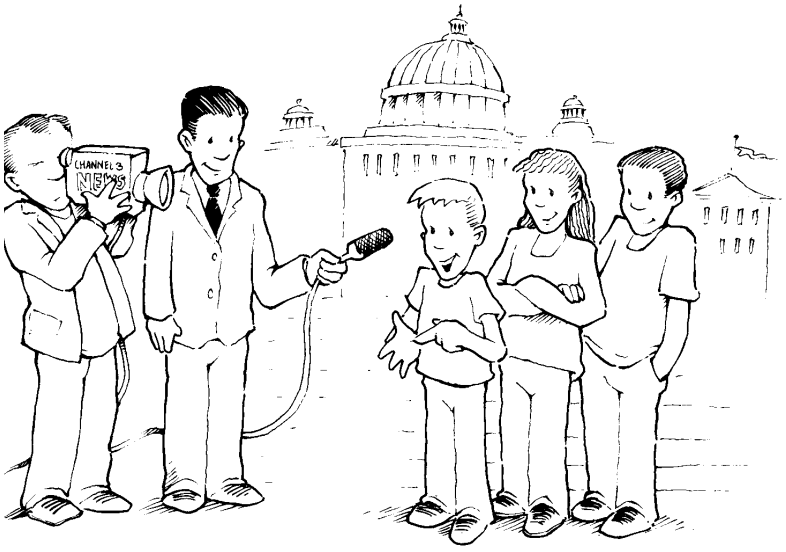
By the year 2000...

Containers and packaging currently comprise the largest portion of the waste stream, 34 percent by weight. However, packaging's share of the waste stream is slowly declining, so that by the year 2000, it will comprise about 30 percent of the waste stream. Because of household growth in the state, 0.5 million tons of trash is expected to be added to the total each year. That's the bad news. The good news is that existing recycling programs around the state are also expected to grow at a rate of 0.5 million tons a year, at no additional cost.

Nondurable goods are projected to become the largest category of municipal solid waste by the year 2000. Nondurables are expected to grow from a 27 percent share by weight in 1995 to a 32 percent share by weight. Nondurable goods are defined as having a life span of less than three years. This category includes newspapers, books, magazines, office paper, advertising materials, disposable diapers, and clothing. Products increasing the most are paper products, especially books, magazines, office paper, and advertising.

Source: Franklin Associates Ltd., Analysis of Trends in Municipal Solid Waste Generation, 1962 to 1987, January 1992.

Instruction Sheet: The Decision Makers



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The Governor has turned to you, a waste expert, to help come up with a plan to solve the state's most critical waste problems. You will be working as part of a team to develop the plan, which you must present to the Governor for approval. Specifically, your team is asked to:

1. Develop a list of priorities,
2. Explain why you chose the priorities, and
3. Provide a list of options for source reduction for each priority on your list.

Before you prepare your plan, you must be well informed. In this activity, you are presented with some information–primarily facts about trash. Through a series of steps, you will use this information to direct and develop a strategy for source reduction.

1. Understand the information.
2. Analyze the information.
3. Use the information to develop a positive solution.

These steps are a simple version of a complex process that product designers, businesses, local and state officials, and other decision makers use to make choices about source reduction. You, too, will be asked to make choices about source reduction. Some may be difficult, while others are obvious.

What is most important is that you use the information to help make your choices. Just as various decision makers may interpret and use the information based on their interests, your answers may be different from the "experts," your teacher, or other students.

This is okay, because what counts is detailed analysis and creative thinking. Solving the trash problem and making source reduction work takes thought, new ideas, choices and, finally, action.

Understand the Information
Students work individually

1. **Read –** Carefully read and study Charts 1 through 4 and the Trash Trivia, below. Although there seems to be only a list of facts, the sum of the information tells you something about the current trash problem as well as future trends.

   Note: Your state's trash problem is a mirror of the country's problems.

2. **Write –** Using the information in the Data Sheets and Trash Trivia, write a one-to two-page summary of what you believe to be the state's largest and most critical trash problems and how source reduction could help solve them.

Analyze the Information
Students work in groups

3. **Report –** Share your written summaries and explain your positions to each other.

4. **Brainstorm –** Use the Decision Grid to develop a list of priorities. You may use the EPA Data Sheets as a guide.

5. **Evaluate –** For each priority, list its current contribution to the waste stream and the amount by which you expect to reduce its contribution. Explain why you feel this savings will be realistic. Again, the Data Sheets will help you. You may need to go to the library to do more research.

6. **Prioritize –** In examining the overall trash problem, try to rank the priorities for source reduction. What is the best way to use the criteria to determine the ranking?

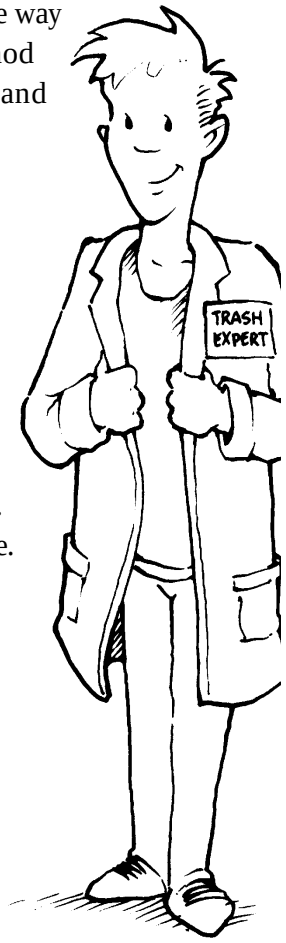
Use the Information to Develop a Plan

7. **Decide –** Using what you've learned so far about various source reduction strategies, think of appropriate options to reduce each of the priorities.

8. **Compare –** Compare the completed grid with your written summaries. Does the grid support your arguments?

9. **Write –** Use the grid and your original summaries to develop a plan for source reduction. Explain what your priorities are and why. In your plan, describe strategies that individuals, businesses, and industries would each use to reduce each priority.

10. **Present –** Here's your chance to use your creative skills and think of an effective way to present your plan. Think of a method that catches the Governor's attention and will "sell" your plan's merits.



Trash Trivia

Different Rates of Growth for Different Materials

Between 1972 and 1987, the number of households in the United States (and in your imaginary state) grew by 34 percent. Solid waste increased at about the same rate. But not all kinds of waste increased at this rate:

- Office paper increased 130%
- Books and magazines increased 84%
- Appliances increased 48%
- Newspapers increased 21%
- Tires increased 15%
- Food packaging increased 7%
- Beer and soft drink cans decreased 29%

Decision Grid

Item	% share of waste stream	Is it a growing problem?	Is it toxic?	*Priority	Options for source reduction

***Priority Ranking system**
1 = high
2 = medium
3 = low
? = not known

An Ounce of Prevention

MIDDLE LEVEL SCIENCE CURRICULUM
ON SOURCE REDUCTION